

Biogeosciences Discuss., referee comment RC2  
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## **Comment on bg-2022-86**

Anonymous Referee #2

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Referee comment on "Interannual variability of the initiation of the phytoplankton growing period in two French coastal ecosystems" by Coline Poppeschi et al., Biogeosciences Discuss., <https://doi.org/10.5194/bg-2022-86-RC2>, 2022

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### **Main findings of the study**

In this manuscript, the authors describe the interannual variability of the phytoplankton blooms contrasting two coastal eutrophic French bays. By using a combination of high-frequency in situ information (buoys) and simulation model (IDV) they attempted to identify main environmental drivers (climatic – hydrological) that modulate variations in observed and estimated parameters of the phytoplankton growth given some explanations of the role of water temperature and turbidity variables. Here a main time delay in triggering phytoplankton blooms was detected during 2010-2020 period. The authors also pointed out the strong influence of “extreme events” such as cold spells and floods over phytoplankton blooms during winter.

Although the authors do some interesting observational/modelling approaches with the data available, the manuscript is mostly presented as a description of the data, thus, their interpretations remain mostly speculative. I strongly suggest using additional information such as inorganic nutrients since both bays are defined as eutrophic systems. The main objective is not clearly defined, it should be written as a major one; there are statements very descriptive at the Results section with too many figures, hard to understand showing different years, etc. In addition, I strongly recommend that the authors should make a major effort to write a general hypothesis or conceptual model for a future version.

### **Specific comments:**

1.- The first limitation that comes to mind is the low sampling effort carried out in Bay of Vilaine for the chlorophyll-a (as fluorescence) variable, with only the second period survey completed. Would be possible to fill the gap of the first period with satellite images? In Bay of Brest appears to be an increase trend during the second period and probably both bays may be affected by similar drivers.

2.- Inorganic nutrients: Although both bay are classified as eutrophic areas, the manuscript does not present data on N and Si; Si:N and Si:P are interesting ratios to explore in the near surface layer, especially for diatoms, a groups that needs silicic acid for the frustule and for dinoflagellates which are associated to nitrogen sources. Species/functional groups could respond more to ratios than concentrations; for example, cryptophytes and dinoflagellates may respond better to N sources (i.e. nitrate, ammonia), whereas diatoms could respond better to silicic acid concentrations.

3.- Model: There are several not clear issues in the parametrization of the model (Table 1), mainly in the methodology section: some restrictions on some parameters could be explained in more detail; for example, the initial value of O for dinoflagellates at the Bay of Vilaine; the starting values for N and Si nutrients, are they coming from a observed data base?

4.- Functional groups: Authors stated that *Skeletonema* spp. and *Chaetoceros* spp. as dominant species during both periods; would be possible that the increase in fluorescence is due to changes in taxonomical groups? Since both bays are under the influence of nutrient loading (mainly nitrogen), would be possible that the toxic dinoflagellates dominance would be part of the seasonal succession or interannual variability? Any evidence of more frequent and intense Harmful Algal Blooms (HABs) during the annual cycle or during climatological-hydrological extreme events?

5.- According to authors, Temperature and Turbidity were the main drivers (I should prefer to say factors) of the variability of phytoplankton growth, however there is poor mechanistic explanation for their effects: to the mixing/stratification process such as Sverdrup hypothesis? Turbidity could affect in both ways to phytoplankton growth: large concentrations of terrigenous particles could decrease light penetration or increase inorganic nutrients (N, P) flux adjacent coastal land.